

What Is Claimed Is:

- 1           1.       A template for oligonucleotides synthesis comprising:  
2                   a Watson-Crick nucleotide region, having two ends;  
3                   a Hoogsteen nucleotide region, having two ends;  
4                   at least one linker region attaching at least one of said ends of said Watson-Crick  
5       nucleotide region and at least one of said ends of said Hoogsteen nucleotide region;  
6                   wherein, said Watson-Crick nucleotide region and said Hoogsteen nucleotide region  
7       are capable of forming a triplex with substrate nucleotides.
- 1           2.       The template for oligonucleotide synthesis of claim 1, wherein said at least one linker  
2       region comprises two linker regions.
- 1           3.       The template for oligonucleotide synthesis of claim 1, wherein said linker region is  
2       selected from the group consisting of an oligonucleotide, an oligopeptide, and a polyether.
- 1           4.       The template for synthesis of oligonucleotides of claim 1 further comprising at least  
2       one primer.
- 1           5.       The template for oligonucleotide synthesis claim 4, wherein said at least one primer  
2       comprises two primers.

1           6.       The template for oligonucleotide synthesis of claim 4, wherein said at least one  
2       primer is covalently bound to said at least one linker region.

1           7.       A method for synthesizing oligonucleotides comprising:  
2                preparing a solution of substrate mononucleotides;  
3                adding a circular polynucleotide template to said solution;  
4                allowing said mononucleotide substrates and said circular polynucleotide template  
5       to form a triplex;  
6                adding a reaction mixture to said solution, thereby causing the ligation of the  
7       mononucleotide substrates so as to form an oligonucleotide;  
8                denaturing said triplex; and,  
9                separating said oligonucleotide from said circular polynucleotide template.

1           8.       The method of claim 7 further comprising adding a pH buffer to said solution.

1           9.       The method of claim 7, wherein said reaction mixture comprises cyanogen bromide  
2       and a divalent metal salt.

1           10.      The method of claim 9, wherein said divalent metal salt is selected from the group  
2       consisting of magnesium chloride, barium chloride, manganese chloride, nickel chloride, cobalt  
3       chloride, copper chloride, zinc chloride, calcium nitrate or calcium chloride.

1 11. The method of claim 9, wherein the concentration of said divalent metal salt is  
2 between 20 and 200 mM.

1 12. The method of claim 7 further comprising the step of increasing the temperature of  
2 said solution to greater than 10°C.

1 13. A method for synthesizing oligonucleotides comprising:  
2 forming a solution of substrate nucleotides;  
3 forming a solution of circular polynucleotide templates within a dialysis bag, wherein  
4 said dialysis bag allows diffusion of oligonucleotides but prevents diffusion of circular templates;  
5 immersing said dialysis bags in said solution of substrate nucleotides;  
6 allowing triplex formation between said templates and said substrate nucleotides  
7 within said dialysis bags;  
8 addition of the reaction mixture to said solution, thereby causing ligation of said  
9 substrate nucleotides to form an oligonucleotide;  
10 denaturing said triplex, thereby dissociating said oligonucleotide from said template;  
11 allowing said oligonucleotide to diffuse outside said dialysis bag; and  
12 removing said dialysis bag from said solution.

1 14. The method of claim 13 further comprising raising the temperature of said substrate  
2 nucleotide solution to greater than 10°C.

1            15.        The method of claim 13, wherein said substrate nucleotides is selected from the group  
2        consisting of mononucleotides, oligonucleotides, or polynucleotides.

1            16.        The method of claim 13, wherein said reaction mixture is comprised of cyanogen  
2        bromide and a divalent metal salt.

1            17.        The method of claim 16, wherein the concentration of said divalent metal salt is  
2        between 20 and 200 mM.

1            18.        The method of claim 16, wherein said divalent metal salt is selected from the group  
2        consisting of magnesium chloride, barium chloride, manganese chloride, nickel chloride, cobalt  
3        chloride, copper chloride, zinc chloride, calcium nitrate or calcium chloride.